Large On-site Sewage Systems (LOSS) Inspection, Schematic, and Engineering Evaluation Guidance for Existing Systems

This guidance identifies a baseline for inspecting, documenting, and writing an evaluation report of existing large on-site sewage system (LOSS) facilities and operations. Department of Health's intent for the guidance is to ensure that this information documents that existing LOSS are operating properly, or identifies improvements that may be needed.

We may require an inspection, schematic, and/or evaluation when there is no, or limited, information on the LOSS, or when we're concerned about the capacity or effectiveness of the LOSS treatment or management. We may narrow the scope of the investigation by directing emphasis on certain parts of the LOSS, or reducing the evaluation to cover only certain components.

The inspection, schematic, and evaluation must be prepared, stamped, signed and dated by a qualified engineer licensed in Washington State (see WAC 196-23).

LOSS Inspection Requirements

To determine the condition of an existing LOSS, we may direct the owner to hire an engineer to inspect and document existing conditions and send us a copy of inspection results. This is done when we can find no, or incomplete, records of the LOSS facilities and maintenance needs.

LOSS Schematic Requirements

To determine the size, treatment type, and location of an existing LOSS, we may direct the owner to hire an engineer to inspect and document existing conditions and send us a copy. This is done when we can find no, or incomplete, records of the approved LOSS installation.

LOSS Evaluation Requirements

If we require an evaluation report, which normally uses the inspection results and schematic, we expect the engineer to evaluate the entire system to determine if it is functioning properly and treating sewage as required. When we review your evaluation report, we will charge you our normal hourly review fee (see WAC 246-272-3000).

We use the report, inspection results, and schematic to determine if the LOSS might be impacting the environment or public health. The report may be required:

- To document existing LOSS performance, condition, and necessary improvements;
- Prior to any additional flow approval (expansion); or
- If the existing system appears to not meet current standards of practice.

Each LOSS installation is different and may require different or additional tests or evaluations. Items in the report checklist are the backbone of an evaluation, but not all-inclusive. Please consult with us on the scope and expectations prior to starting work.

The report includes the inspection results and the engineer's professional evaluation of:

- Treatment capacity;
- Treatment effectiveness;
- Whether the LOSS is adequate and safe for its current use or a proposed expansion; and
- What improvements may be needed for capacity, treatment, and safety.

LOSS Inspection Requirements			
		Item	**Discussion**
☐	1.	Inspect all components of the LOSS.	For the report and schematic, observe and record volumes, dimensions, materials, construction, condition, and location.
☐	A.	Inspect each grease interceptor, if there is one or more. Record the last pumping date.	If there is no grease interceptor, discuss this with respect to the sewage strength. Is a grease interceptor needed?
☐	B.	Inspect each septic tank and other sewage tank. Determine sludge level. Note the last pumping date of the septic tank. What is the condition of the effluent screen?	You can determine the volume of a tank by using its internal measurements or from septic tank pumping records. A local pumping company may have records.
☐	C.	Inspect each treatment component not otherwise mentioned in the checklist.	The LOSS may have additional treatment elements or may not treat sewage through a septic tank.
☐	D.	Inspect each pump and pump vault. If a pump is utilized, note the pump make and model. Perform a pump test to determine actual pump flow rate. Are there alarms? Are they working?	
☐	E.	Determine the drainfield pump dose volume and rotation schedule.	
☐	F.	If a siphon is utilized, determine the dose volume.	
☐	G.	Collect an effluent sample prior to the drainfield and note the location where the sample was taken. Submit to an accredited lab for analysis of: • Total nitrogen; • $CBOD_5$; • TSS; • Oil & grease; and • Fecal coliform (if required).	

LOSS Inspection Requirements			
		Item	**Discussion**
☐	H.	Inspect the drainfield and reserve area – including distribution boxes and pumps. Are there signs or known details of past events where sewage surfaced? Determine the depth to the infiltrative surface.	For documenting the area of the drainfield, you can determine the trench width by either probing the soil to locate laterals or by exposing the end of the lateral enough to see the trench width. These should also reveal depth to the infiltrative surface.
☐	I.	If the system uses distribution boxes, expose them and check for (equal) distribution to the laterals.	
☐	J.	Inspect all maintenance-related parts of the LOSS.	For example, tank lids raised to the surface, access to distribution boxes, drainfield monitoring ports installed and accessible.
☐	2.	Locate and record the lines and pumps in the collection system. Determine age and condition.	
☐	3.	Determine number and types of connections to the LOSS.	How many are residences (include number of bedrooms); how many are commercial (what type of business)?
☐	4.	Have an electrician evaluate the condition of all electrical components.	
☐	5.	Observe and record the location of all existing buildings, wells, property lines, and easements. (Items listed in WAC 246-272B-06050, Table 3)	Items 5, 6, 7, and 8 document how well sited the LOSS is. If surface water or drinking water wells are too close, for example, a higher level of treatment may be indicated.
☐	6.	Observe and record the location of all potable water and irrigation lines that are within 10 feet of the edge of the drainfield and within 10 feet of any LOSS component.	
☐	7.	Observe and record the location of drainages and surface waters within 1000 feet of the drainfield.	

LOSS Inspection Requirements			
		Item	**Discussion**
☐	8.	Prepare and evaluate at least one soil pit adjacent to the drainfield.	Note the depth of unsaturated, medium-textured soil from the drainfield's infiltrative surface to saturated soil, the water table, or a confining layer, whichever occurs first. Is it 3 feet? Note soil(s) color (grey, red & grey, etc). Is there clay or compacted or dense soil?

LOSS Schematic Requirements			
		Item	**Discussion**
☐	9.	Indicate the map scale and include a north arrow.	
☐	10.	Label the schematic with name of the LOSS and date, and include the engineer's signed stamp.	
☐	11.	Map all the features determined from the inspection, and label.	If the drainfield is on another property, be sure to identify the different parcels and indicate distance and pipe conveyance details.
☐	12.	Identify any significant topographical features. Use maximum intervals of five feet.	

LOSS Evaluation Requirements			
		Item	**Discussion**
☐	1	Explain how the LOSS currently operates.	Include any resting or cycling of the drainfields, including seasonal use patterns.

LOSS Evaluation Requirements			
		Item	**Discussion**
☐	1.	Report on the condition of all inspected components of the LOSS. Note which components were not, or could not be, inspected. Discuss the operations and maintenance program for the LOSS.	

LOSS Evaluation Requirements			
		Item	**Discussion**
☐	1	Discuss the expected influent sewage strength; compared it to residential strength. Identify the known or calculated design flow and compare with the actual or estimated peak flows. Is each component of the system, including the drainfield, properly sized? Discuss the results of the effluent sample. Is the treatment adequate and working properly for the conditions? Discuss any known history or physical indicators of previous failure (surfacing, back-ups). Note any repair history.	• For sewage strength, consider whether there are RV connections, food establishments, etc. contributing flow. • If the design flow is unknown, use the limiting factor among the LOSS components. For example, the size of the septic tank or drainfield may determine the maximum flow that the LOSS can effectively treat. • Actual flow can be calculated by run time for pumps, and the pump capacity. • If actual flow is unknown, you can estimate it based on existing connections (and known undeveloped lots – future connections). Use standard flow and peaking values noted in WAC 246-272B-06150, or justify alternate values. • Note that the design flow incorporates an operating capacity and a surge capacity. • A system operating at design flow or higher may be subject to early failure.
☐	1	Include the volumes, dimensions, and materials of the various system components you recorded from the inspection.	

LOSS Evaluation Requirements			
		Item	**Discussion**
☐	1	Evaluate soils and vertical separation in the area of the drainfield. Discuss whether it is appropriate for the type and capacity of treatment components that are installed.	• Calculate the drainfield's infiltrative surface (square footage). • Calculate actual loading rates and compare to the maximum allowable hydraulic loading rates in WAC 246-272B-03400, Table 1.
☐	1	Submit well logs for up to five of the closest wells within 1,000 feet of the drainfield area. Make sure they are referenced to the well locations on the schematic.	Well logs are available through the Department of Ecology at https://fortress.wa.gov/ecy/waterresources/map/WCLSWebMap/default.aspx. **NOTE:** Depending on system location and other information provided in the evaluation, we may require a site risk survey (SRS) or nitrate balance. Guidance and forms are located at: Site Risk Survey Form: http://www.doh.wa.gov/Portals/1/Documents/Pubs/337-068.doc Level 1 Nitrate Balance Instructions: http://www.doh.wa.gov/Portals/1/Documents/Pubs/337-069.pdf Level 1 Nitrate Balance Spreadsheet: http://www.doh.wa.gov/Portals/1/Documents/Pubs/337-070.xls We'll notify the LOSS owner of any additional requirements and schedules after reviewing the engineer's evaluation report.
☐	1	Determine if system is located within a locally designated sensitive or critical area, such as a Critical Aquifer Recharge Area or Marine Recovery Area. Are there any environmental red flags?	This information should be available at city or county planning offices or the local library.

LOSS Evaluation Requirements			
		Item	**Discussion**
☐	2	If the drainfield is within 1000 feet of surface water, as noted in the inspection, describe the surface water.	Is it a river, lake, marine water, seep, or other? Is the surface water upgradient of the drainfield, or downgradient? What is the surface water used for? Recreation, drinking water supply, or other?
☐	2	Explain your conclusions on whether the tanks and pump chambers are watertight. Recommend testing or repair, if appropriate.	Tanks may be determined to be water tight by checking the water levels in the tanks over a period of time when there is no use, or by taking dissolved oxygen samples at the tank outlet. High dissolved oxygen in the septic tank can indicate infiltration of groundwater into the tank.
☐	2	If the system uses pressure distribution, document the residual head in each drain line. Compare this data with the results of the final inspection performed at construction completion, if available.	Note that the flow difference over the entire (existing) system must not exceed 15%.
☐	2	Evaluate the collection system. List properties (addresses and type of customer) connected to system.	• Are mains on private property? Do they have easements? • Is this a STEP system? If so, how and by whom are the individual tanks and pumps maintained? • Would you expect there to be infiltration/inflow issues?

LOSS Evaluation Requirements			
		Item	**Discussion**
☐	2.	Evaluate the overall status of the LOSS and site features you inspected. Is it conforming, nonconforming, functioning, or failing? Are there known threats to public health and/or the environment? State your conclusions and recommendations.	
☐	2.	List any improvements made during the inspection or evaluation.	For example, the following may have been done during the inspection: leveling the distribution boxes; changes to the pump settings; jetting of drainfield lines, placing or replacing screens.
☐	2.	List and prioritize any improvements you recommend. Include a timeline for when you believe these improvements should be completed.	• Is there a repair and replacement fund? • Does the LOSS have a plan for O&M and replacement? • The LOSS owner may wish to have you include cost estimates for the improvements you recommend.

For assistance contact:
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